What is claimed is:

1. A semiconductor photodetector comprising:

(i)a semiconductor substrate;

(ii)an optical waveguide having

(a)a first conductivity type semiconductor layer formed on the semiconductor substrate,

(b)an optical waveguide core layer formed on a partial area of the first conductivity type semiconductor layer, and

(c)an upper cladding layer formed on the optical waveguide core layer; and

(iii)an avalanche photodiode coupled to the optical waveguide, constructed by forming in sequence on another area of the first conductivity type semiconductor layer

(a)a photo absorbing layer,

(b)a heterobarrier relaxing layer, an underlying layer of a first conductivity type field dropping layer,

(c)an overlying layer of the first conductivity type field dropping layer,

(d)a carrier multiplying layer, and

(e)a second conductivity type semiconductor layer;

wherein a side surface of the underlying layer of the first conductivity type field dropping layer comes into contact with a side surface of the optical waveguide core layer, and a part of the overlying layer of the first conductivity type field dropping layer is formed on the optical waveguide core layer.

2. A semiconductor photodetector according to claim 1, wherein a film thickness of the carrier multiplying layer is set to more than 0.07 μm but less than 0.1 μm, and a film thickness of the photo absorbing layer is set to more than 0.15 μm but less than 0.2 μm.

3. A semiconductor photodetector according to claim 1, wherein composition of the underlying layer of the first conductivity type field dropping layer is changed from a lower surface to an upper surface to function as the heterobarrier relaxing layer.

4. A semiconductor photodetector according to claim 1, wherein a band gap of the heterobarrier relaxing layer is larger than a band gap of the photo absorbing layer, and a band gap of the carrier multiplying layer is larger than a band gap of the heterobarrier relaxing layer.

5. A semiconductor photodetector according to claim 1, wherein the underlying layer of the first conductivity type field dropping layer is formed of N-type InGaAs, and the overlying layer of the first conductivity type field dropping layer is formed of N-type InP.

6. A semiconductor photodetector according to claim 1, wherein the semiconductor substrate is an InP substrate, the first conductivity type semiconductor layer is an N-type InP layer, the photo absorbing layer is an undoped InGaAs layer, the heterobarrier relaxing layer is an undoped InGaAsP layer, the carrier multiplying layer is an undoped InP layer, the optical waveguide core layer is an

undoped InGaAsP layer, and the upper cladding layer is an InP layer.

7. An avalanche photodiode comprising:

(i)a semiconductor substrate;

(ii)a photo absorbing layer formed over the semiconductor substrate and having a film thickness of more than 0.15 μm but less than 0.2 μm; and

(iii)a carrier multiplying layer formed over the photo absorbing layer and having a film thickness of more than 0.07 μm but less than 0.1 μm.

8. An avalanche photodiode according to claim 7, further comprising:

a heterobarrier relaxing layer formed on the photo absorbing layer; and

a field dropping layer formed on the heterobarrier relaxing layer;

wherein the carrier multiplying layer is formed on the field dropping layer.

9. An avalanche photodiode according to claim 7, wherein the photo absorbing layer is an undoped InGaAs layer, and the carrier multiplying layer is an undoped InP layer.